

# Glossary and Acronyms

This section provides definitions of terms and acronyms used in the workbook. A reference list of on-line glossaries is also provided at the end of this section.



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**2DDP** Two-dimensional data plane set up to assess transport; terminology used in the Lake Michigan Ozone Study.

**Aerometric Information Retrieval System (AIRS)** A computer-based repository of U.S. air pollution information administered by the EPA Office of Air Quality Planning and Standards.

**agl** above ground level

**Air Parcel** A volume of air that tends to be transported as a single entity.

**Air Pollution** Degradation of air quality resulting from unwanted chemicals or other materials occurring in the air

**Air Quality Index (AQI)** Reports levels of ozone and other common air pollutants. The higher the AQI rating for a pollutant, the greater the change. For guidance on how to compute the AQI, see <http://www.epa.gov/ttn/oarpg/t1/memoranda/rg701.pdf>

**AIRS** See Aerometric information retrieval system

**Anthropogenic** Produced by human activities.

**Anthropogenic emissions** Emissions from man-made sources as opposed to natural (biogenic) sources

**ARIMA** Auto-regressive integrated moving average

**Attainment Area** A geographic area in which levels of a criteria air pollutant meet the health-based primary standard (National Ambient Air Quality Standard, or NAAQS) for the pollutant. An area may have an acceptable level for one criteria air pollutant but may have unacceptable levels for others. Thus, an area could be both attainment and nonattainment at the same time. Attainment areas are defined using federal pollutant limits set by the U.S. Environmental Protection Agency.

**Bottom-up emission inventory evaluation** Method of assessing emissions data using census information and emissions activity data combined with emission factors to generate emissions estimates.

**b<sub>scat</sub>** Light-scattering coefficient

**CAA** See Clean Air Act

**CALMET** Diagnostic meteorological model

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**CALRAMS** Prognostic meteorological model

**Carbon monoxide (CO)** A colorless, odorless, poisonous gas, produced by incomplete burning of carbon based fuels

**CART** Classification and regression tree; useful for classifying days on the basis of the ozone formation potential of meteorological conditions

**CBIV** Carbon bond IV chemical reaction mechanism scheme

**CBL** Convective boundary layer (the daytime boundary layer).

**CI** Confidence interval. Provides a range of plausible values for the true population mean based on a sample taken from the population. An approximate 95% CI for a single mean is  $\bar{x} \pm 2se$  where the standard error (se) of a single mean is estimated as  $s/\sqrt{n}$  where s is the standard deviation and n is the number of samples.

**Clean Air Act (CAA)** The original Clean Air Act was passed in 1963, but our national air pollution control program is actually based on the 1970 version of the law. The 1990 Clean Air Act Amendments are the most far-reaching versions of the 1970 law. The 1990 amendments are commonly referred to as the 1990 Clean Air Act.

**CMB** Chemical mass balance model; used to apportion ambient pollutants to emission sources.

**CMSA** Consolidated metropolitan statistical area

**C<sub>n</sub><sup>2</sup>** Radar profiler reflectivity; a measure of the variations in the refractive index of the atmosphere.

**CNG** Compressed natural gas

**CO** See Carbon monoxide

**CV** Coefficient of variation; the standard deviation divided by the sample mean.

**Design Value** The monitored reading used by EPA to determine an area's air quality status; for example, for ozone, the fourth highest reading measured over the most recent three years is the design value.

**E** Extent of reaction, used in MAPPER observational based modeling software

**Emission Inventory** A list of air pollutants emitted into a community's atmosphere in amounts (commonly tons) per day or year, by type of source.

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**Emission Factor** A measure of an average rate of emission of a pollutant for a defined activity rate.

**EPS2.0 or 2.5** Emissions Processing System versions 2.0 or 2.5

**EPA** Environmental Protection Agency

**Eulerian** models solve the advection-diffusion equation. In an Eulerian framework the solution is obtained relative to a fixed grid, at which both the pollutant concentrations and meteorological variables are defined. Eulerian approaches are most suitable when complex emission and non-linear chemical conversions are involved. Eulerian Dispersion Model:

$$dC/dt = [\text{advection}] + [\text{diffusion}] + [\text{source}] + [\text{sinks}]$$

**Exceedance** A measured level of an air pollutant higher than the national or state ambient air quality standard.

**Hazardous air pollutants (HAPs)** Toxic chemicals that cause serious health and environmental effects

**HCHO** Formaldehyde; an important chemical used widely by industry to manufacture building materials and other household products. Also a by-product of combustion and other natural processes.

**HDDT** Heavy-duty diesel truck

**HNO<sub>3</sub>** Nitric acid; formed in the atmosphere by reaction of NO<sub>2</sub> and water droplets.

**H<sub>2</sub>O<sub>2</sub>** Hydrogen peroxide; formed in the atmosphere by reaction of ozone and water vapor.

**Inspection and maintenance program (I/M program)** Auto inspection programs are required for some polluted areas. These periodic inspections, usually done once a year or once every two years, check whether a car is being maintained to keep pollution down and whether emission control systems are working properly. Vehicles which do not pass inspection must be repaired.

**LAA** Lowest altitude average

**Lagrangian** models solve the advection-diffusion equation. In the Lagrangian frame, the advection diffusion equation is rewritten in terms of the total derivative, such that the change of concentration is computed following the parcel as it is advected by the wind. Lagrangian models are most applicable to point-source simulations. Lagrangian Dispersion Model:  
$$DC/Dt = [\text{diffusion}] + [\text{source}] + [\text{sinks}]$$

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**Level 0 validation** Routine checks made during the initial data processing and generation of data, including proper data file identification, review of unusual events, review of field data sheets and result reports, instrument performance checks and deterministic relationships.

**Level I validation** Tests for internal consistency to identify values in the data which appear atypical when compared to values of the entire data set.

**Level II validation** Comparison of the current data set with historical data to verify consistency over time. This level can be considered a part of the data interpretation or analysis process.

**Level III validation** Tests for parallel consistency with data sets from the same population (i.e., region, period of time, air mass, etc.) to identify systematic bias. This level can also be considered a part of the data interpretation or analysis process.

**LMAQR** Lake Michigan air quality region

**LMOS** Lake Michigan Ozone Study

**LPG** Liquefied petroleum gas

**LQL** Lower quantifiable limit

**LT** Local time

**MDL** Minimum detection limit

**Mean** The total of all values divided by the number of samples.

**Median** The middle value in a sorted list of samples if there are an odd number of samples, or the average of the two middle values if there are an even number of samples.

**MLA** Mixed layer average

**Mobile sources** Motor vehicles and other moving objects that release pollution; mobile sources include cars, trucks, buses, planes, trains, motorcycles, and gasoline-powered lawn mowers. Mobile sources are divided into two groups: road vehicles, which includes cars, trucks, and buses, and non-road vehicles, which includes trains, planes, and lawn mowers.

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**MSA** Metropolitan statistical area

**Multivariate analyses** Statistical procedures that can be used to infer a mix of emission sources impacting a receptor location.

**MW** Molecular weight

**NAMS** National air monitoring stations

**NARSTO** North American Research Strategy for Tropospheric Ozone

**National Ambient Air Quality Standards (NAAQS)** Health-based pollutant concentration limits established by the EPA that apply to outside air.

**NBL** Nocturnal boundary layer (the boundary layer from sunset to sunrise).

**Nitric Oxide** (NO) Precursor of ozone, NO<sub>2</sub>, and nitrate; usually emitted from combustion processes. Converted to nitrogen dioxide (NO<sub>2</sub>) in the atmosphere, it then becomes involved in the photochemical process and/or particulate formation.

**Nitrogen Oxides** (NO<sub>x</sub>) Gases formed in great part from atmospheric nitrogen and oxygen when combustion takes place under conditions of high temperature and high pressure; considered a major air pollutant and precursor of ozone.

**NH<sub>3</sub>** Ammonia; forms as a product of decomposition of animal and vegetable matter. Important in the atmospheric nitrogen cycle.

**NMHC** Non-methane hydrocarbons; defined as the sum of identified hydrocarbons and unidentified mass.

**NMOC** Non-methane organic compounds (NMHC+carbonyl compounds) as defined in the Lake Michigan Ozone Study.

**NMOG** Nonmethane organic gas; term used by some analysts synonymous with TNMOC.

**NO<sub>x</sub>** NO + NO<sub>2</sub> + poorly defined fraction of other NO<sub>y</sub> species (given conventional analyzers)

**NO<sub>y</sub>** NO<sub>x</sub> + HNO<sub>3</sub> + organic nitrates + inorganic nitrates = NO<sub>x</sub> + NO<sub>z</sub>

**NO<sub>z</sub>** Oxidation products of NO<sub>x</sub> = NO<sub>y</sub> x (1 - NO<sub>x</sub>/NO<sub>y</sub>)

**NWS** National Weather Service

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**O<sub>3</sub>** Ozone ; a major component of smog. Ozone is not emitted directly into the air but is formed by the reaction of VOCs and NO<sub>x</sub> in the presence of heat and sunlight.

**OAQPS** Office of Air Quality Planning and Standards

**OBM** Observational-based model

**ODM** Observation-driven method

**OH** Hydroxyl radical; the main driving force behind the daytime reactions of hydrocarbons in the troposphere.

**OTAG** Ozone Transport Assessment Group

**Outliers** Data physically, spatially, or temporally inconsistent.

**OTR** Ozone transport region

**PAMS** Photochemical Assessment Monitoring Stations. EPA program to expand and strengthen ambient air monitoring of VOCs and other ozone precursors.

**PAMS Target Species** 55 C2-C12 hydrocarbons; 2 carbonyl compounds

**PAMSHC** Sum of PAMS target species (AIRS code 43000). Sum of 55 C2-C12 identified hydrocarbons.

**PAN** Peroxyacetylnitrate; A class of chemical substances found as a pollutant in the troposphere, formed by photolysis from natural and manufactured organic chemicals.

**PCA** Principal component analysis

**Photochemical Age** Fraction of initial NO<sub>x</sub> emissions that have been photooxidized = products/total = NO<sub>z</sub>/NO<sub>y</sub>  
= 1 - NO<sub>x</sub>/NO<sub>y</sub>

**PMF** Positive matrix factorization; PMF can be used to determine source profiles based on the ambient data.

**Precursor** Compounds that change chemically or physically after being emitted into the air and eventually produce air pollutants. For example, hydrocarbons and nitrogen oxides are precursors for ozone.

**PTFE** Plastic tubing

**QA** Quality assurance; a set of external tasks to provide certainty that the quality control system is satisfactory. These tasks include independent performance audits, on-site system audits, interlaboratory comparisons, and periodic evaluations of internal quality control data.

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**QC** Quality control; a set of internal tasks performed to provide accurate and precise measured ambient air quality data. These tasks address sample collection, handling, analysis, and reporting (e.g., periodic calibrations, routine service checks, instrument-specific monthly quality control maintenance checks, and duplicate analyses on split and spiked samples).

**RADAR** RAdio Detection And Ranging

**RASS** Radio Acoustic Sounding System

**Receptor model** Statistics-based software tools that equate empirical relationships between ambient data and emissions sources.

**Reformulated gasoline (RFG)** Specially refined gasoline with low levels of smog-forming volatile organic compounds (VOCs) and low levels of hazardous air pollutants. The 1990 Clean Air Act requires sale of reformulated gasoline in the nine smoggiest areas. Reformulated gasoline was sold in several smoggy areas even before the 1990 Clean Air Act was passed.

**Reid Vapor Pressure (RVP)** A measure of volatility in gasoline

**RF** Radio frequency

**Relative humidity** The ratio of the partial pressure of water to the saturation vapor pressure, also called saturation ratio; often expressed as a percentage

**RHC** Reactive hydrocarbons; tem often used in air quality modeling.

**RMAPS** Receptor Model Applied to Patterns in Space

**ROM** Regional oxidant model

**SCAQS** South Coast Air Quality Study

**SCE** Source contribution estimate (CMB model output)

**SIP** See State Implementation Plan.

**SMOKE** Sparse Matrix Operator Kernel Emissions (SMOKE), an emissions processing tool.

**SODAR** SOUNd Detection And Ranging; a wind profiler system.

**Source apportionment** Process of apportioning ambient pollutants to an emissions source.

**SP** Smog produced; term used in the smog production algorithm.



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**SPA** Smog production algorithm; used to determine ozone formation sensitivity to changes in NO<sub>x</sub> concentration.

**Speciation profile** Listing of individual chemical species emitted by a specific source category.

**SPUR** Source Profiles by Unique Ratios

**ST** Standard time

**Standard deviation (S)** measures the spread of a set of data around the center of the data.

**State implementation plan (SIP)** A detailed description of the programs a state will use to carry out its responsibilities under the Clean Air Act. State implementation plans are collections of the regulations used by a state to reduce air pollution. The Clean Air Act requires that EPA approve each state implementation plan.

**Stationary source** A place or object from which pollutants are released and which does not move around. Stationary sources include power plants, gas stations, incinerators, houses, etc.

**Sulfur dioxide (SO<sub>2</sub>)** A pungent, colorless gas formed primarily by combustion of fossil fuels.

**TNMOC** Total nonmethane organic compounds (AIRS code 43102); sum of identified hydrocarbons and unidentified mass from C2 through C12 (PAMSHC + unidentified mass).

**T<sub>v</sub>** Virtual temperature; determined by measuring the vertical speed of an upward-propagating sound pulse, which is a combination of the acoustic velocity and the atmospheric vertical velocity.

**Top-down emission inventory evaluation** Method of assessing emissions data by comparing relative pollutant compositions in the inventory to pollutant compositions in the ambient air.

**UAM** Urban Airshed Model IV = EPA regulations version using CBIV; Urban Airshed Model V = with variable grid

**UNMIX** A multivariate receptor modeling package that inputs observations of particulate composition and seeks to find the number, composition, and contributions of the contributing sources or source types.

**Variance** The square of the standard deviation

**VOC** Volatile organic compound; often used synonymously with NMHC, TNMOC.

**WD** Wind direction

**WS** Wind speed

# References

Bay Area Air Pollution Control District glossary at <http://www.baaqmd.gov/pie/aqgloss.htm>

California Air Resources Board glossary at <http://arbis.arb.ca.gov/html/gloss.htm>

Chemistry Department of Sam Houston State University glossary at <http://www.shsu.edu/~chemistry/Glossary/glos.html>

Louisiana Department of Environmental Quality glossary at <http://www.deq.state.la.us/oarp/ar97/ar97appa.htm>

Minnesota Pollution Control Agency glossary at <http://www.pca.state.mn.us/gloss/>

National Park Service glossary at <http://www.aqd.nps.gov/ard/glossary.html>

STAPPA/ALAPCO: State/Local Air Pollution Control Glossary of Environmental Terms at  
<http://www.4cleanair.org/glossary.html>

U.S. Environmental Protection Agency glossary at [http://www.epa.gov/oar/oaqps/peg\\_caa/pegcaa10.html#topic10](http://www.epa.gov/oar/oaqps/peg_caa/pegcaa10.html#topic10)

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<http://www.epa.gov/oar/aqtrnd97/acron.html>

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